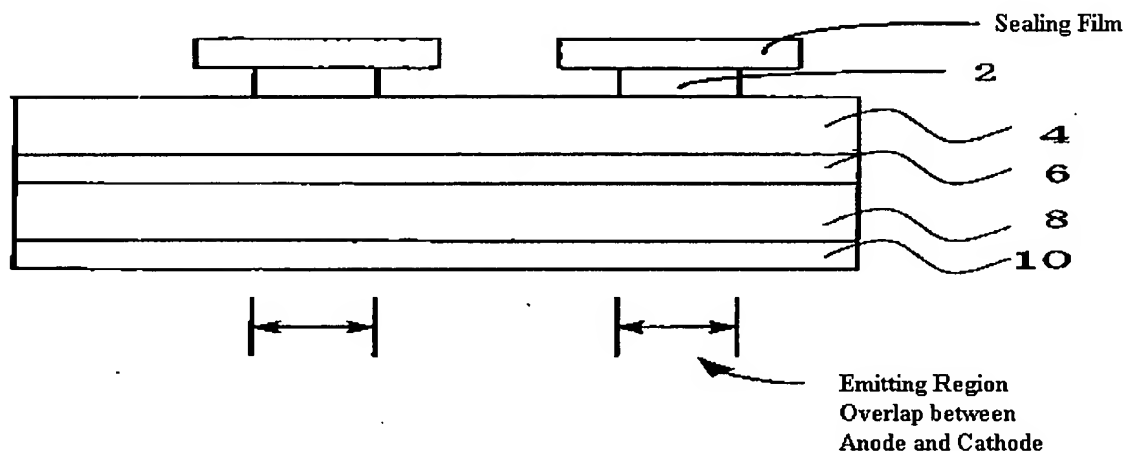


REMARKS

Claims 1, 7-24 and 26-31, as amended, remain herein. Claims 2-6 and 25 have been cancelled. Claims 1, 7, 9, 13, 14, 18 and 27 have been amended. Claim 1 has been amended to include the limitations of former claim 6. Support for the amendments can be found throughout the specification (see, e.g., original claims).

1. Claim 14 was rejected under 35 U.S.C. § 112, second paragraph. Claim 14 has been amended. The figure below shows an example of an organic electroluminescent device according to claim 14 with a sealing film that is larger than an emitting region formed of an overlap between the cathode (2) and the anode (10). Applicants respectfully request reconsideration and withdrawal of this rejection.



2. Claims 1-5, 7, 9, 18-22, 24, 26 and 28 were rejected under 35 U.S.C. § 102(b) over Tanaka et al. U.S. Patent 6,107,734.

Claims 1-5, 9, 24, 26 and 28

Claim 1 has been amended to include the limitations of claim 6, which was not subject to this rejection. This rejection is therefore moot. Claims 24, 26, and 28 depend from claim 1. Claims 2-5 have been cancelled.

Claim 7

Claim 7 recites an organic electroluminescent device comprising: at least two or more emitting layers between an anode and a cathode, and an intermediate electrode layer being interposed between emitting layers, the intermediate electrode layer being a single layer or a multilayer structure, at least one of the layers comprising a semiconductive material, wherein the semiconductive material comprises an acceptor that is a conductive oxide containing a transition metal, and a donor.

Tanaka does not disclose applicants' claimed intermediate electrode layer. Tanaka nowhere discloses applicants' intermediate electrode layer comprising a semiconductive material comprising an acceptor that is a conductive oxide containing a transition metal, and a donor, in the same layer. In Tanaka, the conductive oxide (CuO) and the donor (alkali metal and/or alkaline earth metal) are not present in the same layer. Tanaka discloses stacked layers of P-type semiconductor and N-type semiconductor:

As the intermediate conductive layer, if being the layer capable of injecting holes from one primary surface side and of injecting electrons from the other primary surface side, as well as keeping the approximate equipotential in the layer, the various kinds can be used. To list preferable examples, they are:

- (a) an ultra-thin film metal/the transparent electrode;
- (b) a mixed layer of an electron transport ability compound and an electron injection ability compound/the transparent electrode;
- (c) a mixed layer of a carbon compound and an alkali metal;

(d) a hole conducting ability organic layer/an electron conducting ability organic layer;

(e) P-type semiconductor/N-type semiconductor; and

(f) a P-type conducting ability high polymer/a N-type semiconductor Furthermore, whatever one plane is hole injecting ability and the other plane is electron injecting ability, by combining from some which are used as the intermediate conductive layer of the item (a) to the item (f) such as the thin film metal, the transparent electrode, the mixed layer of the electron transport ability compound and the electron injection ability compound, the hole conducting ability organic layer or P-type or N-type semiconductor, the uses can be more preferably performed.

Tanaka at column 7, lines 42-67 (emphasis added). See also Tanaka's examples (disclosing an intermediate layer including a layer of Alq:Li or Mg:Ag and a conductive oxide film (obtained via sputtering) of In-Zn-O). In Tanaka, the donor is mixed with an electron transport material (such as Alq), not with the acceptor (see Tanaka's Examples).

#### Claim 9

Claim 9 recites an organic electroluminescent device comprising: at least two or more emitting layers between an anode and a cathode, and an intermediate electrode layer being interposed between emitting layers, the intermediate electrode layer being a single layer or a multilayer structure, at least one of the layers comprising a semiconductive material, wherein the semiconductive material is a conductive organic radical salt represented by the following formula (1):



wherein D represents a molecule or an atom having a donor nature, A represents a molecule or an atom having an acceptor nature, y represents an integer of 1 to 5, and z represents an integer of 1 to 5.

The Office Action states that Li:Alq is the organic radical salt wherein Li is the donor atom and Alq is the acceptor compound. Alq, however, is not an acceptor compound but an

electron transport material. Indeed, Tanaka uses a transparent electrode such as an In-Zn-O film as the hole injection layer (see Tanaka at column 7, lines 49-51). In addition, unlike applicants' claimed intermediate electrode layer, Tanaka does not disclose a donor compound and an acceptor compound in the same layer.

#### Claims 18-22

Claim 18 recites an organic electroluminescent device comprising: one or more emitting layers between an anode and a cathode, and bipolar charge injection layers between the anode and the emitting layer nearest to the anode and between the cathode and the emitting layer nearest to the cathode. Claims 19-22 depend from claim 18.

Applicants' claim 18 includes at least two bipolar charge injection layers, one between the anode and the emitting layer nearest to the anode, and one between the cathode and the emitting layer nearest to the cathode. Tanaka does not disclose an organic electroluminescent device having at least two bipolar charge injection layers with the structure disclosed in applicants' claim 18.

Thus, Tanaka does not disclose all elements of applicants' claims and therefore, it is not an adequate basis for a rejection under 35 U.S.C. § 102(b). Applicants respectfully request reconsideration and withdrawal of this rejection.

3. Claims 13, 17 and 25 were rejected under 35 U.S.C. § 102(b) over Parthasarathy et al. U.S. Patent 6,420,031.

Claim 13 recites an organic electroluminescent device comprising: at least one or more emitting layers between an anode and a cathode, the cathode comprising a layer containing at least one donor and at least one acceptor comprising a metal oxide, and the

cathode having a light transmittance of 80 % or more. Claim 17 depends from claim 13.

Claim 25 has been cancelled.

Parthasarathy does not disclose applicants' claimed cathode comprising at least one donor and at least one acceptor comprising a metal oxide, in the same layer. Parthasarathy discloses ITO cathode layers (see Parthasarathy Examples). However, Parthasarathy says nothing about the cathode layer further including at least one donor in the same layer. The copper phthalocyanine or zinc phthalocyanine in Parthasarathy's Examples 1 and 2 are not present in the same layer as the metal oxide but in a distinct layer.

Thus, Parthasarathy does not disclose all elements of applicants' claims and therefore, it is not an adequate basis for a rejection under 35 U.S.C. § 102(b). Applicants respectfully request reconsideration and withdrawal of this rejection.

4. Claim 6 was rejected under 35 U.S.C. § 103(a) over Tanaka in view of Mori U.S. Patent 6,215,245. Claim 1 has been amended to include the limitations of claim 6. Claim 6 has been cancelled.

Claim 1 recites an organic electroluminescent device comprising: at least two or more emitting layers between an anode and a cathode, and an intermediate electrode layer between emitting layers, the intermediate electrode layer being a single layer or a multilayer structure, at least one of the layers comprising a semiconductive material, the semiconductive material comprising at least one conductive oxide containing a transition metal selected from the group of NbO<sub>x</sub>, LaO<sub>x</sub>, NdO<sub>x</sub>, SmO<sub>x</sub>, EuO<sub>x</sub>, MoO<sub>x</sub>, ReO<sub>x</sub>, WO<sub>x</sub>, OsO<sub>x</sub>, IrO<sub>x</sub> and PtO<sub>x</sub> wherein x is 0.2 to 5.

As admitted in the Office Action, Tanaka says nothing about applicants' claimed intermediate electrode layer comprising a semiconductive material comprising at least one

conductive oxide containing a transition metal selected from the group of  $\text{NbO}_x$ ,  $\text{LaO}_x$ ,  $\text{NdO}_x$ ,  $\text{SmO}_x$ ,  $\text{EuO}_x$ ,  $\text{MoO}_x$ ,  $\text{ReO}_x$ ,  $\text{WO}_x$ ,  $\text{OsO}_x$ ,  $\text{IrO}_x$  and  $\text{PtO}_x$  wherein  $x$  is 0.2 to 5. Mori does not teach or suggest what is missing from Tanaka.

Contrary to the assertion in the Office Action, Tanaka does not teach or suggest that any electrode material is suitable for use in the intermediate layer. Tanaka discloses an intermediate layer including a layer for injecting holes from one and a layer for injecting electrons (Tanaka at column 7, lines 42-46). Tanaka further discloses the use of a transparent electrode such as an In-Zn-O film as the layer for injecting holes not electrons. Mori, on the other hand, teaches the use of conductive oxides as stabilizing compounds for low work function sodium or potassium cathodes. A person of ordinary skill in the art would not be motivated to substitute the hole injection In-Zn-O film with Mori's cathode material comprising sodium or potassium and a conductive oxide. Furthermore, while Mori states that conductive oxides are suitable for use in the cathode to stabilize the sodium or potassium material, Mori does not say that the conductive oxides enhance the injection efficiency of the cathode. To the contrary, Mori explains that:

If the cathode can be made up of sodium and/or potassium elements alone, it is then possible to make the work function lowest. However, since the sodium and/or potassium elements are extremely reactive and, hence, unstable materials, it is preferable to mix them with relatively stable other metal for stabilization.

Mori at column 3, lines 28-33.

Thus, none of Tanaka and Mori discloses or suggests applicants' claimed invention. In addition, there is no disclosure or suggestion in any of Tanaka, Mori, or anything else in this record that would have suggested the desirability of combining any portions thereof effectively to anticipate or render obvious applicants' claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

5. Claim 8 was rejected under 35 U.S.C. § 103(a) over Tanaka in view of Kido U.S. Patent Application Publication 2003/0189401. Claim 8 depends from claim 7.

As discussed above, Tanaka does not disclose all elements of claim 7. Specifically, Tanaka does not disclose applicants' intermediate electrode layer comprising a semiconductive material comprising an acceptor that is a conductive oxide containing a transition metal, and a donor, in the same layer. Kido does not teach or suggest what is missing from Tanaka. Kido says nothing about an intermediate electrode layer comprising a semiconductive material comprising an acceptor that is a conductive oxide containing a transition metal, and a donor.

Thus, none of Tanaka and Kido discloses or suggests applicants' claimed invention. In addition, there is no disclosure or suggestion in any of Tanaka, Kido, or anything else in this record that would have suggested the desirability of combining any portions thereof effectively to anticipate or render obvious applicants' claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

6. Claim 23 was rejected under 35 U.S.C. § 103(a) over Tanaka. Claim 23 depends from claim 18.

As discussed above, Tanaka does not disclose applicants' claimed organic electroluminescent device having at least two bipolar charge injection layers one between the anode and the emitting layer nearest to the anode and one between the cathode and the emitting layer nearest to the cathode.

Thus, Tanaka does not disclose or suggest applicants' claimed invention. In addition, there is no disclosure or suggestion in Tanaka, or anything else in this record that would have suggested the desirability of combining any portions thereof effectively to anticipate or

render obvious applicants' claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

7. Claims 9-12 were rejected under 35 U.S.C. § 103(a) over Tanaka in view of Liao et al. U.S. Patent Application Publication 2003/0170491.

As discussed above, Tanaka does not disclose all elements of claim 9. Specifically, Tanaka does not disclose applicants' intermediate electrode layer comprising a semiconductive material, wherein the semiconductive material is a conductive organic radical comprising a molecule or an atom having a donor nature, and a molecule or an atom having an acceptor nature, in the same layer.

Liao does not teach or suggest what is missing from Tanaka. Liao says nothing about an intermediate electrode layer comprising a conductive organic radical salt including a donor and an acceptor in the same layer. Indeed, in Liao, the organic connector includes an n-type doped organic layer and/or a p-type doped organic layer (see Liao at paragraph [0059]). Liao nowhere discloses a p-type dopant and an n-type dopant in the same layer.

Thus, none of Tanaka and Liao discloses or suggests applicants' claimed invention. In addition, there is no disclosure or suggestion in any of Tanaka, Liao, or anything else in this record that would have suggested the desirability of combining any portions thereof effectively to anticipate or render obvious applicants' claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

8. Claim 27 was rejected under 35 U.S.C. § 103(a) over Tanaka in view of Forrest et al. U.S. Patent 5,703,436. Claim 27 depends from claim 18.



As discussed above, Tanaka does not disclose all elements of claim 18. Specifically, Tanaka does not disclose applicants' claimed organic electroluminescent device having at least two bipolar charge injection layers one between the anode and the emitting layer nearest to the anode and one between the cathode and the emitting layer nearest to the cathode.

Forrest does not teach or suggest what is missing from Tanaka. Forrest nowhere discloses applicants' claimed organic electroluminescent device having at least two bipolar charge injection layers, one between the anode and the emitting layer nearest to the anode, and one between the cathode and the emitting layer nearest to the cathode.

Thus, none of Tanaka and Forrest discloses or suggests applicants' claimed invention. In addition, there is no disclosure or suggestion in any of Tanaka, Forrest, or anything else in this record that would have suggested the desirability of combining any portions thereof effectively to anticipate or render obvious applicants' claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

9. Claims 14-16 were rejected under 35 U.S.C. § 103(a) over Parthasarathy in view of Okada et al. U.S. Patent 6,143,434. Claims 14-16 depend from claim 13.

As discussed above, Parthasarathy does not disclose all elements of applicants' claim 13. Specifically, Parthasarathy does not disclose applicants' claimed cathode comprising a layer containing at least one donor and at least one acceptor comprising a metal oxide, in the same layer.

Okada does not teach or suggest what is missing from Parthasarathy. Okada says nothing about cathode comprising a layer containing at least one donor and at least one acceptor comprising a metal oxide, in the same layer.

Thus, none of Parthasarathy and Okada discloses or suggests applicants' claimed invention. In addition, there is no disclosure or suggestion in any of Parthasarathy, Okada, or anything else in this record that would have suggested the desirability of combining any portions thereof effectively to anticipate or render obvious applicants' claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

10. Claim 25 was rejected under 35 U.S.C. § 103(a) over Liao et al. U.S. Patent 6,717,358. Claim 25 has been cancelled. Claim 13 has been amended to include the limitations of claim 25.

Claim 13 recites an organic electroluminescent device comprising: at least one or more emitting layers between an anode and a cathode, the cathode comprising a layer containing at least one donor and at least one acceptor comprising a metal oxide, and the cathode having a light transmittance of 80 % or more.

Liao does not teach or suggest applicants' claimed cathode comprising, in the same layer, at least one donor and at least one acceptor comprising a metal oxide. As admitted in the Office Action, Liao discloses an n-type doped organic layer distinct from the p-type doped organic layer (see Liao at Abstract). In addition, Liao discloses an interface layer between the n-type doped layer and the p-type doped layer to prevent diffusion between the two layers (see Liao at Abstract). Furthermore, contrary to the assertion in the Office Action, the connecting units are not part of the cathode and nothing in Liao suggests that they are. In fact, there is an emitting layer between the cathode and the connecting unit confirming that the connecting units are not part of the cathode (see Liao at FIG. 1).

Thus, Liao does not disclose or suggest applicants' claimed invention. In addition, there is no disclosure or suggestion in Liao or anywhere else in this record that would have

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suggested the desirability of combining any portions thereof effectively to anticipate or render obvious applicants' claimed invention. Applicants respectfully request reconsideration and withdrawal of this rejection.

For all of the foregoing reasons, applicants respectfully request that all rejections be withdrawn all that all claims 1, 7-24 and 26-31 be allowed. The PTO is hereby authorized to charge or credit any necessary fees to Deposit Account No. 19-4293. Should the Examiner deem that any further amendments would be desirable in placing this application in even better condition for issue, the Examiner is invited to telephone applicants' undersigned representative.

Respectfully submitted,

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